

22. The method of claim 15, wherein the alkylsilane is derived from a common methylsilane selected from the group of methylsilane, dimethylsilane, trimethylsilane, and combinations thereof.

28. (Cancelled) The method of claim 1, wherein the metal barrier layer comprises a material selected from the group of tantalum, tantalum nitride, titanium, titanium nitride, and combinations thereof.

REMARKS

This is intended as a full and complete response to the Final Office Action dated September 5, 2002, having a shortened statutory period for response set to expire on December 5, 2002. Claims 1-8, 10-13, 15-22 and 28 are pending in the application. Claims 1-8, 10-13, 15-22 and 28 were considered by the Examiner and stand rejected. Applicants cancel claims 1-8, 10-13, and 28 without prejudice. Applicants believe that no new matter has been introduced in this response.

Claims 1-8, 10-13, and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of *Endo et al.* '150 and Europe '440, of record. The Examiner asserts that it would have been within the scope of one of ordinary skill in the art to combine the teachings of *Endo et al.* '150 and Europe '440 to enable the formation of the SiC layers of Europe '440. Applicants have cancelled claims 1-8, 10-13, and 28, and will present substantive arguments with respect to the references cited by the Examiner for the subject matter of claims 1-8, 10-13, and 28, in a preliminary amendment accompanying a continuation application. Withdrawal of the rejection is respectfully requested.

Claims 15-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of *Endo et al.* '150 and Europe '440 as applied to claims 1-8, 10-13, and 28, and further in view of Applicant's admitted prior art and either one of *Zhao* and *Somekh*. The Examiner asserts that it would have been within the scope of one of ordinary skill in the art to combine the teachings of *Endo et al.* '150 and Europe '440

with the etch stops of *Somekh* and *Zhao* to enable the formation of the structure of Figure 1. Applicants respectfully traverse this rejection.

Endo et al. '150 discloses a process for depositing silicon carbide on a substrate. The substrate may be metallic, such as aluminum material. Europe '440 discloses depositing a silicon carbon barrier layer on a metal surface, between two metal layers to prevent interlayer diffusion, or between a metal and a dielectric material to prevent diffusion of the metal into the dielectric material and insulate layers of wiring.

With respect to application of claims 1-8, 10-13, and 28, *Endo et al.* '150 and Europe '440, either alone or in combination, do not disclose depositing a silicon carbide barrier layer on the substrate by a method comprising introducing an alkylsilane and a noble gas into a chamber, initiating a plasma in the chamber, and reacting the alkylsilane in the presence of the plasma to form silicon carbide, depositing a metal barrier layer on the silicon carbide barrier layer, and depositing a metal layer over the metal barrier layer, as recited in claim 1, and claims dependent thereon. Examples of metal barrier layer materials include tantalum (Ta) tantalum nitride (TaN), titanium (Ti), titanium nitride (TiN). (See page 3, lines 23-25, Figure 1; and page 11, lines 15-27, and Figure 4).

With respect to claims 15-22, *Somekh* discloses depositing a carbon based etch stop, such as a diamond like amorphous carbon and fluorocarbon, having a low dielectric constant in a method for forming a dual damascene structure.

Zhao discloses depositing a etch stop over a low k dielectric layer, and the dielectric layer may comprise a variety of dielectric materials including silicon carbide. However, Applicants submit that *Zhao* is not prior art based on the accompanying Rule 131 Affidavit that states the date of invention by the Applicants is at least September 25, 1998, which is the filing date of *Zhao*.

Endo et al. '150, Europe '440, and *Somekh*, either alone or in combination, do not disclose depositing a copper layer over a tantalum nitride layer to fill a feature definition and depositing a silicon carbide passivation layer on the copper layer.

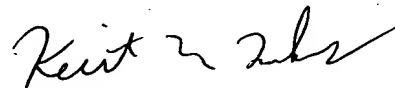
Thus, *Endo et al.* '150, Europe '440, and *Somekh*, either alone or in combination, do not teach, show, or suggest depositing a silicon carbide barrier layer on the substrate by a method comprising, introducing an alkylsilane and a noble gas into a chamber,

initiating a plasma in the chamber, and reacting the alkylsilane in the presence of the plasma to form silicon carbide, depositing a first dielectric layer on the silicon carbide layer, depositing a silicon carbide etch stop having an etch selectivity ratio of at least about 40 to 1 on the first dielectric layer by a method comprising, introducing an alkylsilane and a noble gas into a chamber, initiating a plasma in the chamber, and reacting the alkylsilane in the presence of the plasma to form silicon carbide, patterning the silicon carbide etch stop, depositing a second dielectric layer on the silicon carbide etch stop, etching the first dielectric layer and the second dielectric layer to form a feature definition, depositing a tantalum nitride barrier layer in the feature definition, depositing a copper layer over the tantalum nitride layer to fill the feature definition, and depositing a silicon carbide passivation layer on the copper layer, as recited in claim 15. Withdrawal of the rejection of claims 15-22 is respectfully requested.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspects of the invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



Keith M. Tackett
Registration No. 32,008
MOSER, PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd., Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant(s)